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(54) Wheel with o-ring tyre

(57) The wheel e.g. for a hand-propelled paint stripping apparatus, is provided with a groove (39) in its outer surface in which an O-ring (41) is positioned. The narrow O-ring spaces the outer surface (19a, 19b) of the wheel away from the surface over which the wheel rolls and increases the frictional engagement of the wheel with the surface. The apparatus equipped with such wheels is thus able to maintain a straight course even when encountering gravel, pebbles and the like.

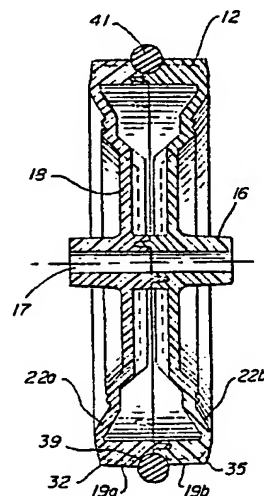
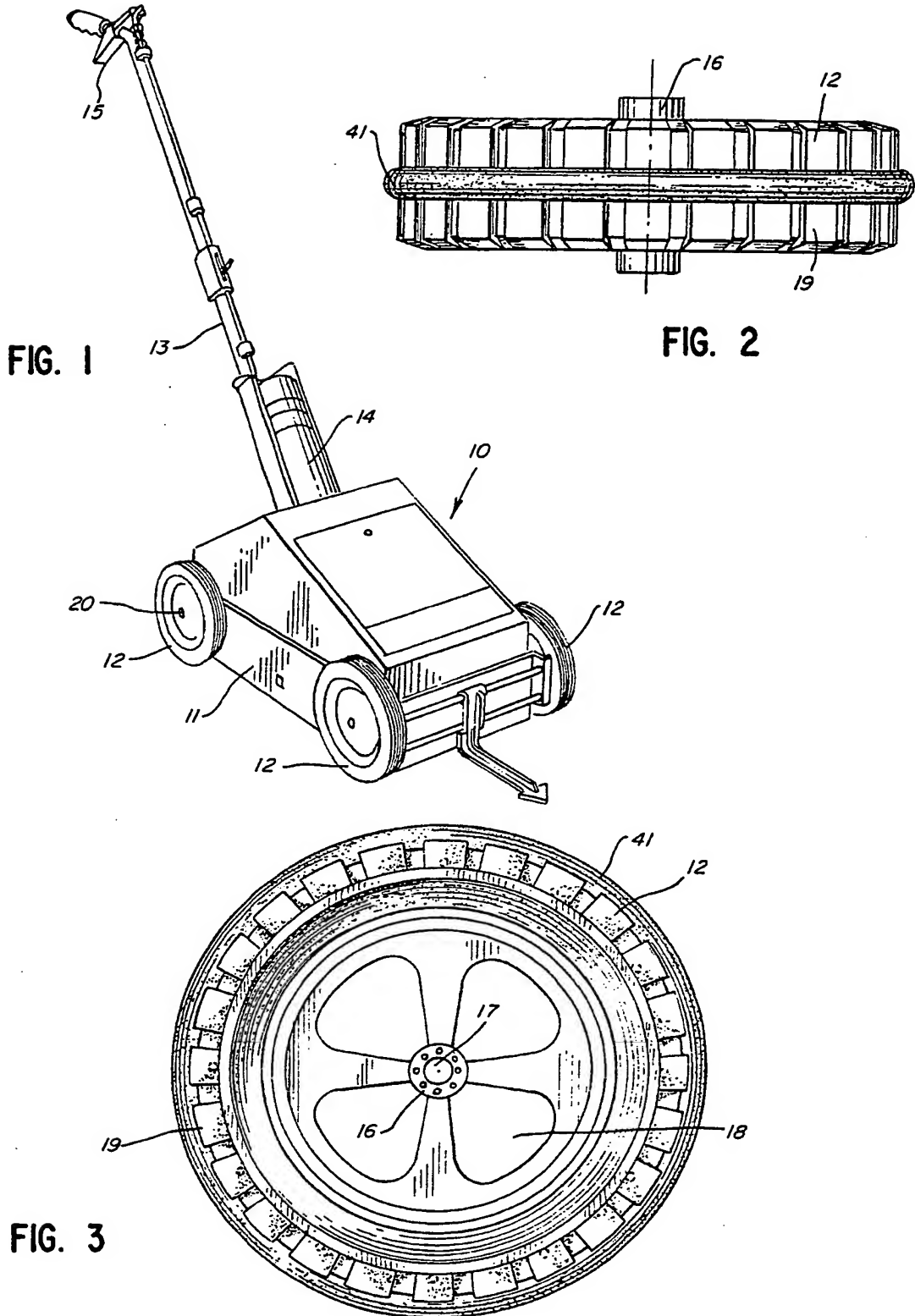


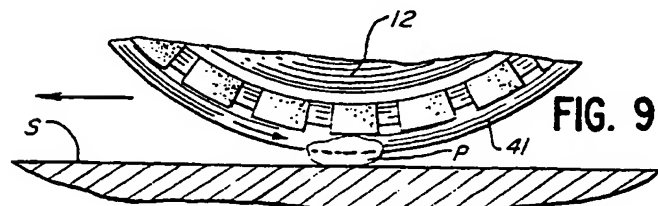
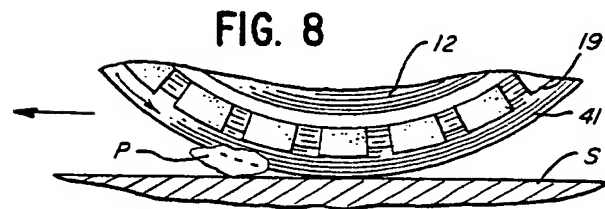
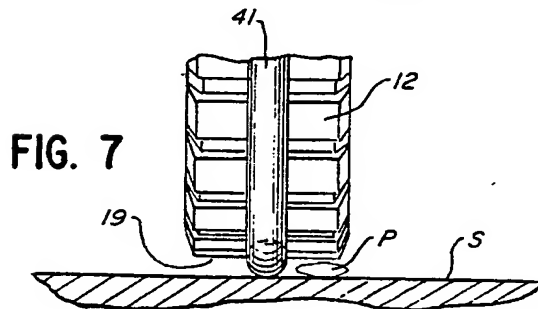
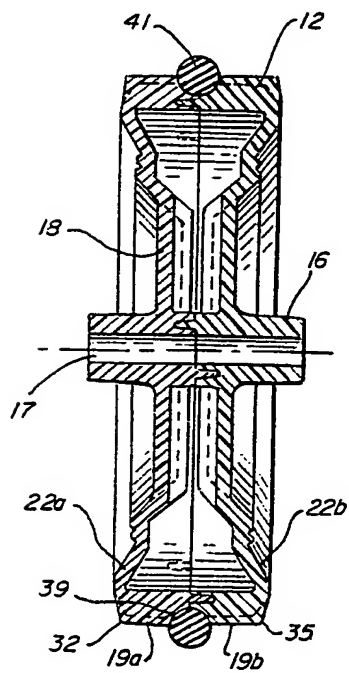
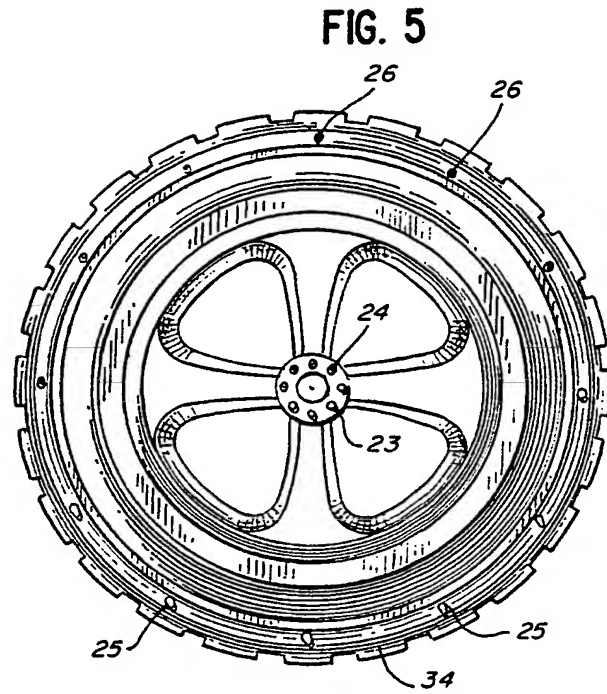
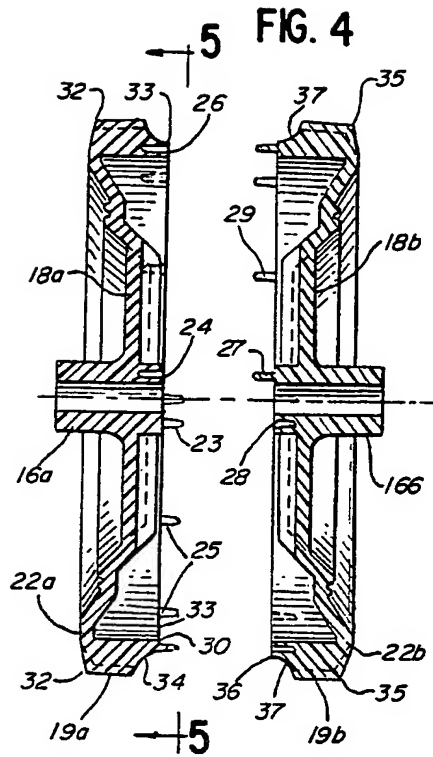
FIG. 6

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SPECIFICATION

Wheel with O-ring

5 This invention relates to wheels, and, more particularly, to a wheel which includes an O-ring for reducing the contact area between the wheel and the surface over which it rolls. The wheel can therefore roll in a straight line without interference from

10 pebbles and the like on the surface.
The invention finds particular utility in devices which are to be rolled over a surface in a relatively straight line and which may encounter surface irregularities such as gravel, pebbles, and the like.
15 For example, US Patent Nos. 4,262,821, 3,796,353 and 3,700,144 describe paint striping machines which are rolled over a surface on which a stripe of paint is sprayed. It is usually desirable that the paint stripe be as straight as possible. Such paint striping
20 machines are often used on surfaces on which gravel, pebbles, stones, and other interfering objects may lie in the path of the striping machine. When the wheels of the striping machine encounter a pebble or the like, the direction of the striping machine can be altered, and the pattern of the stripe will accordingly be changed.

Another problem with wheels for devices such as paint striping machines is cost. Rubber-tyred or treaded wheels provide good traction but are relatively expensive. Plastics wheels are cheaper than rubber-treaded wheels, but plastics wheels have less traction than rubber-treaded wheels. If a paint striping machine were equipped with plastics wheels, the relatively poor traction of the wheels
35 would make it difficult to advance the machine in a straight line.

The invention provides a plastics wheel which is equipped with an O-ring which spaces the outer surface of the plastics wheel above the surface and
40 which provides good frictional engagement between the wheel and the surface. The O-ring is relatively narrow and therefore is less likely to engage a pebble or the like than the wider surface of the wheel. The O-ring spaces the outer surface of the
45 wheel sufficiently above the surface that the wheel will not contact many pebbles of common size. If the wheel does contact a relatively large pebble, the wheel more easily rolls over the pebble because of the spacing provided by the O-ring. When the O-ring
50 itself encounters a pebble, the rounded surface of the O-ring will generally push the pebble to one side, and the pebble will not alter the direction in which the wheel is rolling.

The invention will be explained, by way of example, in conjunction with an illustrative embodiment shown in the accompanying diagrammatic drawings, in which:

Figure 1 is a perspective view of a paint striping machine equipped with rollers in accordance with
60 the invention;

Figure 2 is a plan of one of the wheels;

Figure 3 is a side elevation of one of the wheels;

Figure 4 is an exploded sectional view of the wheel;

65 *Figure 5* is a side elevation taken along the line 5-5

of *Figure 4*;

Figure 6 is a sectional view of the wheel;

Figure 7 is a fragmentary end view showing the wheel passing over a pebble;

70 *Figure 8* is a fragmentary side view showing the wheel about to encounter a relatively large pebble; and

Figure 9 is a view similar to *Figure 8* showing the wheel rolling over the pebble.

75 Referring first to *Figure 1*, the numeral 10 designates generally a paint striping machine of the general type which is described in the aforementioned United States patents. The machine includes a body 11, four wheels 12, and a handle 13 for
80 pushing the machine over the surface which is to be striped. An aerosol can 14 filled with paint or marking material is supported on the handle 13, and a trigger 15 on the upper end of the handle 13 can be operated to open the valve of the aerosol can 14 and
85 spray the contents of the can toward the surface.

Such paint striping machines are conventionally rolled over parking lots, roadways, walkways, and other surfaces on which it is desired to paint stripes. Gravel, pebbles, and other irregularities may often
90 be present on the surface, and it is desirable that the wheels not be misdirected by such irregularities.

Referring now to *Figures 3-6*, each of the wheels 12 includes a hub portion 16 which is provided with an axle opening 17, a disc portion 18, and an outer
95 generally cylindrical surface 19. An axle 20 (*Figure 1*) extends through the axle opening 17 and rotatably mounts the wheel on the body of the striping machine.

In the particular embodiment illustrated, the wheel 100 is formed from a pair of moulded halves 22a and 22b (see particularly *Figures 4* and *6*). The wheel half 22a includes a plurality of pins 23 and pin holes 24 which extend arcuately around the hub portion 16a of the wheel half and a plurality of pins 25 and pin holes 26
105 which extend arcuately adjacent the outer surface of the wheel half 22a. Similarly, the wheel half 22b includes pins 27 and pin holes 28 around the hub 16b and pins 29 and pin holes 30 adjacent the outer surface. The pins and pin holes of each wheel half
110 are sized and arranged so that the pins of one half can be inserted into the pin holes of the other half. In the specific embodiment shown in the drawings, the pins are located on one 180° segment of each wheel half, the pin holes are located on the other 180°
115 segment, and each wheel half is formed from the same mould to provide two identical wheel halves. Alternatively, the pins and pin holes could be arranged alternately around each wheel half or in some other arrangement which would provide a
120 mating relationship between the pins and pin holes of the two halves.

The wheel also could have a rib on one half and a groove in the other half into which the rib would be inserted. A rib could be provided around the hub and
125 also around the outer rim. In this case, the two halves of the wheel would not be identical.

The wheel half 22a includes an outer surface 19a which extends between an outer edge 32 and an inner edge 33. A groove 34 is formed in the outer
130 surface 19a adjacent the inner edge 33. Similarly, the

wheel half 22b includes an outer surface 19b which extends between an outer edge 35 and an inner edge 36, and a groove 37 is formed adjacent the inner edge 36.

- 5 When the two wheel halves are joined by inserting the pins of each half into the pin holes of the other half, a groove 39 (Figure 6) is formed which is semicircular in cross-section. The pins can be retained in the pin holes either by a friction fit or by
10 adhesives, chemical solvents or the like. In the particular embodiment illustrated, the groove 39 is positioned midway between the two outer edges 32 and 35 of the wheel, and the axle dimension of each of the outer surface portions 19a and 19b is substantially the same.

- 15 An O-ring 41 is positioned in the groove 39 and projects radially outwardly beyond the outer surface of the wheel. The O-ring 41 is preferably formed from elastomeric material, such as rubber or synthetic rubber, and the friction between the O-ring 41 and the surface over which the paint striping machine is rolled is substantially greater than the friction between the plastics wheel 12 and the surface. The O-ring therefore substantially increases the traction
20 between the wheel and the surface.

- 25 The inside diameter of the O-ring 41 in its relaxed state before mounting on the wheel is preferably somewhat less than the minimum diameter of the groove 39 so that the O-ring 41 is stretched when it is inserted in the groove 39. The frictional force between the O-ring 41 and the surface of the groove 39 restrains relative rotation between the O-ring 41 and the wheel.

- 30 The cross-section of the O-ring 41 may take many shapes, for example, round, oval, square, D-shaped, etc. However, the preferred shape is round, and the O-ring and the groove 39 are preferably sized so that approximately one-half of the cross-sectional circumference of the O-ring is exposed between the
40 outer surfaces 19a and 19b of the wheel halves as shown in Figure 6.

- 45 The outer surfaces 19a and 19b of the wheel halves may be moulded in the shape of a tyre tread for aesthetic purposes. However, since these surfaces do not contact the surface over which the wheels roll, these surfaces may be cylindrical or smooth. Since any tread is primarily for aesthetic purposes, even treaded outer surfaces can be considered as smooth or cylindrical for purposes of the
50 invention.

- 55 As can be seen in Figures 7 and 8, the O-ring 41 of each of the wheels contacts the surface S, and the outer surface 19 of the wheel is spaced above the surface. When the wheel encounters a pebble P whose height is less than the space between the surface S and the outer surface 19 of the wheel, the wheel rolls over the pebble without interferences as shown in Figure 7. When the pebble is big enough to contact the outer surface of the wheel as shown in Figure 8, the wheel will generally roll over the pebble without changing direction. This is because the outer surface of the wheel will generally contact the pebble high enough to permit the wheel to roll easily over the pebble as illustrated in Figures 8 and 9. If
60 the wheel were not spaced from the surface by the

O-ring, even small pebbles could cause the wheel to skid or veer away from the direction in which the wheel is rolling.

- 65 In the event that the O-ring encounters a pebble or the like, the rounded outer surface of the O-ring will generally push the pebble to one side or the other. The wheel can then roll over the pebble as previously described.

- 70 In one specific embodiment, the O-ring 41 had a cross-sectional dimension $3/8$ inch (≈ 9.5 mm). The outside diameter of the wheel was $5-3/8$ inches (≈ 136.5 mm). Half of the cross-sectional circumference of the O-ring was exposed outside of the groove in the wheel, and the outer surface of the
80 wheel was therefore spaced $3/16$ inch (≈ 4.8 mm) above the surface over which the wheel rolled. The dimension of the O-ring in the axial direction of the wheel which was exposed out of the groove was $3/8$ inch (≈ 9.5 mm). The axial dimension of each of the flat outer surface portions 19a and 19b of the wheel halves was about $1/2$ inch (≈ 12.7 mm), and the axial dimension of the O-ring was therefore only slightly greater than 25% of the entire axial dimension of the outer surface of the wheel.

- 90 It has been found that a wheel formed in accordance with the invention may cost about one-half of the cost of a conventional rubber-tired wheel and only slightly more than a plastics wheel. However, the inventive wheel has substantially more traction
95 than a plastics wheel and approximately the same traction as a rubber wheel. Further, the reduced surface contact between the inventive wheel and the surface makes the inventive wheel substantially less subject to being misdirected by pebbles and other surface irregularities than either the plastics wheel or the rubber wheel.

- 100 While in the foregoing specification a detailed description of a specific embodiment of the invention was set forth for the purpose of illustration, it will be understood that many of the details herein given may be varied considerably by those skilled in the art without departing from the spirit and scope of the invention.

110 CLAIMS

1. A wheel comprising an axle portion, a generally cylindrical outer surface, the generally cylindrical outer surface having spaced-apart first and second outer edges, and a ring of friction material extending circumferentially around the cylindrical outer surface intermediate the first and second edges thereof and extending radially outwardly beyond the cylindrical outer surface to provide the wheel with first and second generally cylindrical outer surface portions and a radially outwardly extending friction ring between the first and second outer surface portions.
2. A wheel according to Claim 1, in which the ring has a curved outer surface between the first and second outer surface portions.
3. A wheel according to Claim 1 or 2, in which the ring is formed of elastomeric material.
4. A wheel according to any one of Claims 1 to 3, in which the generally cylindrical outer surface is provided with a groove therein between the first and
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second edges and the ring is an O-ring which is positioned in the groove.

5. A wheel according to Claim 4, in which the wheel is formed from a pair of moulded plastics halves which are joined along a plane which extends through the groove.

6. A wheel according to Claim 5, in which both the moulded plastics halves are identical and each includes a plurality of axially extending pins and pin holes, the pins of one of the halves being inserted into the pin holes of the other half.

7. A wheel according to any one of Claims 4 to 6, in which the O-ring has a circular cross-section and approximately one half of the cross-sectional configuration of the O-ring is positioned radially outwardly of the first and second outer surface portions of the wheel.

8. A marking apparatus adapted to be wheeled over a surface to be marked, comprising a base for supporting a container of marking material and a plurality of wheels rotatably mounted on the base, each of the wheels comprising an axle portion, a generally cylindrical outer surface, the generally cylindrical outer surface having spaced-apart first and second outer edges, and a ring of friction material extending circumferentially around the cylindrical outer surface intermediate the first and second edges thereof and extending radially outwardly beyond the cylindrical outer surface to provide the wheel with first and second generally cylindrical outer surface portions and a radially outwardly extending friction ring between the first and second outer surface portions, so that in use of the first and second outer surface portions are spaced above the surface to be marked.

9. A marking apparatus according to Claim 8, in which the ring of each of the wheels has a curved outer surface between the first and second outer surface portions of the wheel.

10. A marking apparatus according to Claim 8 or 9, in which the ring of each of the wheels is formed of elastomeric material.

11. A marking apparatus according to any one of Claims 8 to 10, in which the generally cylindrical outer surface of each of the wheels is provided with a groove therein between the first and second edges and the ring of each of the wheels is an O-ring which is positioned in the groove.

12. A marking apparatus according to Claim 11, in which each of the wheels is formed from a pair of moulded plastics halves which are joined along a plane which extends through the groove.

13. A marking apparatus according to Claim 12, in which both the moulded plastics halves are identical and each includes a plurality of axially extending pins and pin holes, the pins of one of the halves being inserted into the pin holes of the other half.

14. A marking apparatus according to Claim 11, in which each of the O-rings has a circular cross-section and approximately one half of the cross-sectional configuration of the O-ring is positioned radially outwardly of the first and second outer surface portions of the wheel.

15. A wheel according to Claim 1, constructed,

arranged and adapted to operate substantially as herein described with reference to, and as shown in, the accompanying drawings.

16. A marking apparatus according to Claim 8, constructed, arranged and adapted to operate, substantially as herein described with reference to, and as shown in, the accompanying drawings.

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